Laboratory Technical Services Branch

Network Architecture to Support NextGen Testing

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Agenda

- **FAA NextGen Test Methodology**
- **New FAA Domain Required**
- **NextGen R&D Domain Definition**
- **Internal Enclave**
- **External Enclave**
- **Notional NextGen R&D Domain**
- **External Enclave Capabilities**
- **External Enclave Connectivity**
- **NextGen Testing and the New Domain**
- **Questions**

FAA NextGen Test Methodology

- **Traditional FAA Programs**
  - One Prime Development Contractor
  - One platform/system
  - Planned Life Cycle

- **NextGen Program Introduces Scope and Culture Change**
  - Modernizing the whole NAS
  - Solving multiple disparate problems
  - Capability integration versus system-level development
  - Many collaborative parties
    - Geographically distributed
  - R&D activities solving many diverse requirements
    - Using POCs, Collaboration, Demonstrations, Development, etc.

- **How do we position ourselves to meet the new challenge?**

New FAA Domain Required

- **NextGen R&D experienced similar requirements that face NextGen Test**
  - Large scope
  - Many partners
  - Collaborative environment

- **Required need for new FAA Network Domain**
  - NextGen R&D Domain was created

NextGen R&D Domain Definition

- **Enterprise solution**
  - Creates dedicated domain for FAA NextGen and R&D activities
  - Meets network & data needs of NextGen projects while protecting NAS assets
  - Streamlines process for connection to FAA R&D networks and data
  - Common needs are centralized and shared among projects
  - Relieves need to establish separate connections
  - Enterprise data services allows for efficient data distribution and management
- **Users**
  - NextGen R&D, integration, demonstration, and testing activities
- **Comprised of two enclaves:**
  - Internal
  - External
- **FAA Sponsor – Steve Bradford, ANG-3**
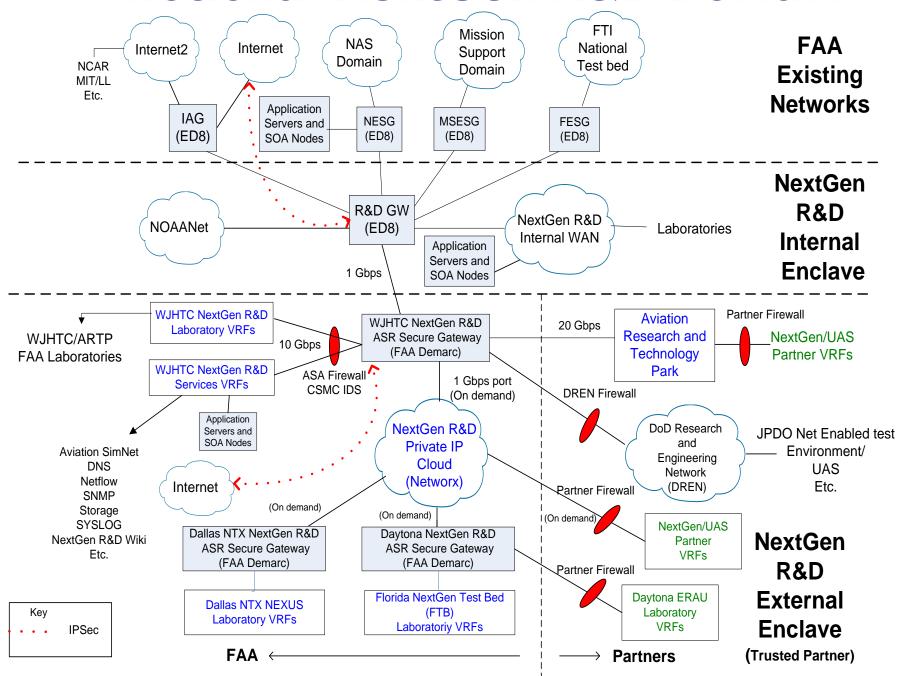- **FAA Program Manager - Andras Kovacs, ANG-C5**

Internal Enclave

- **For FAA-led (NextGen roadmap) activities, including NAS prototyping and demonstrations**

- **Considered part of FAA enterprise and a secure/trusted network segment**

- **External partners would likely be required to connect via a security gateway**

  - Authentication and encryption required (i.e. Site-to-Site Virtual Private Network (VPN)

- **FAA Telecommunications Infrastructure (FTI) will provide and manage Wide Area Network (WAN) and security infrastructure**

External Enclave

- **For partner-led activities, including FAA and non-FAA test bed sites**

- **Utilizes a security approach that facilitates partner collaboration**
  - Industry/Academia/other Government/FAA
  - Provides end-to-end security

- **Open to those that want to connect, subject to FAA approval**

- **Commercial Private IP service will provide WAN connectivity**

- **FAA manages External Enclave network**
  - Provide network backbone with level playing field

Notional NextGen R&D Domain

FAA Existing Networks

Internet2

Internet

NAS Domain

Mission Support Domain

FTI National Test bed

NCAR MIT/LL Etc.

IAG (ED8)

Application Servers and SOA Nodes

NESG (ED8)

MSESG (ED8)

FESG (ED8)

NextGen R&D Internal Enclave

NOAANet

R&D GW (ED8)

NextGen R&D Internal WAN

Laboratories

Application Servers and SOA Nodes

1 Gbps

WJHTC NextGen R&D Laboratory VRFs

WJHTC NextGen R&D ASR Secure Gateway (FAA Demarc)

20 Gbps

Aviation Research and Technology Park

Partner Firewall

NextGen/UAS Partner VRFs

WJHTC/ARTP FAA Laboratories

10 Gbps

WJHTC NextGen R&D Services VRFs

ASA Firewall CSMC IDS

Application Servers and SOA Nodes

1 Gbps port (On demand)

DREN Firewall

Aviation SimNet
DNS
Netflow
SNMP
Storage
SYSLOG
NextGen R&D Wiki
Etc.

Internet

NextGen R&D Private IP Cloud (Networx)

DoD Research and Engineering Network (DREN)

JPDO Net Enabled test Environment/ UAS Etc.

Partner Firewall

NextGen/UAS Partner VRFs

(On demand)

(On demand)

(On demand)

Dallas NTX NextGen R&D ASR Secure Gateway (FAA Demarc)

Daytona NextGen R&D ASR Secure Gateway (FAA Demarc)

Partner Firewall

Daytona ERAU Laboratory VRFs

NextGen R&D External Enclave

Dallas NTX NEXUS Laboratory VRFs

Florida NextGen Test Bed (FTB) Laboratoriy VRFs

(Trusted Partner)

Key

IPSec

FAA ← → **Partners**

External Enclave Capabilities

Network infrastructure and services:

- Efficiently scales point-to-multipoint connectivity while providing full path isolation
    - End-to-end security of proprietary data / boundary protection at the laboratory level
    - Secure, yet open environment facilitates NextGen R&D activities and doesn't interfere with application development
- Utilizes Multi-Protocol Label Switching (MPLS) to meet all partner requirements
- Scalable on-demand WAN bandwidth increases
- Streamlines concept & application development, integration, & test
- Provides secure centralized access to select FAA laboratories and data
- Relieves need to establish separate connections
- Private IP cloud is a physically separate managed network

External Enclave Connectivity

- **Four remote connectivity methods**
  - NextGen R&D Private IP Network
    - Partner maintains network edge at partner facility
    - Partner provisioned/billed through GSA Networx after FAA approval
      - GSA negotiated WAN rates
  - Partner WAN Network
    - Ex. DoD Research and Engineering Network (DREN)
  - ARTP
    - 10Gbps backbone via WJHTC NextGen Metropolitan Area Network (MAN)
  - VPN over Internet
    - Used for developmental and integration support and non-performance critical applications

- **Management and Technical Support**
  - 24/7 service request and trouble call intake
  - Centralized network monitoring services

NextGen Testing and the New Domain

- R&D Domain can support all aspects of NextGen testing

- Notional approach:
  - External Enclave
    - Proof of Concepts
    - Concepts of Operation
    - Developmental Testing
    - Demonstrations
    - Early integration with partners and NAS
    - Etc.
  - Internal Enclave
    - FAA led testing using FAA systems

Questions

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